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A BIBLIOGRAPHY OF KANSAS GEOLOGY, WITH SOME ANNOTATIONS.

BY ROBERT HAY.

INTRODUCTORY NOTE.

When the idea of compiling this bibliography was becoming an intention, I remember that Capt. Vogdes, of the Fifth U. S. Artillery, had told me that he was collecting books on Kansas geology, and I therefore wrote asking him to assist by giving me a list of the books he had, or knew about, bearing on the subject. He very kindly complied and sent me a list of no less than seventy titles, including nearly all the earlier works, and forming a very good start for my somewhat lengthy talk. In the progress of the work I have had valuable assistance from the librarians of the Academy of Science, State Historical Society, the State Library, and the State University, as well as from my honored friend, Mrs. Mudge of Manhattan. It is possible that some important papers may have escaped me, and I have purposely omitted newspaper articles, although there are some of an interesting character. The order is that of Capt. Vogdes's list. First come U. S. Government publications; then Kansas official papers, and afterward reports of other states and societies, miscellaneous magazines, etc. Text-books and maps are at the end. I have thought it would aid future investigators if they knew where, in Kansas, the books and pamphlets named might be consulted, and have therefore indicated their presence in the Academy library by the letter A; in the Historical Society by H; State Library by the letter S; and in the State University by U. The letter V indicates the list of Capt. Vogdes. It is hoped the compilation will serve as a valuable check-list, and I shall be obliged if friends will communicate to me additional titles for future publication.

I. UNITED STATES GOVERNMENT REPORTS.

History of the Expedition, under the command of Captains Lewis and Clarke, to the sources of the Missouri river, thence across the Rocky Mountains and down the Columbia river, performed during the years 1804-5-6.

Philadelphia, 1824. Vol. I, xxvii and 470 pp. Vol. II, ix and 522 pp., map. (H S V).

Account of an Expedition from Pittsburgh to the Rocky Mountains, performed in the years 1819, 1820, etc., by S. H. Long, 2 volumes. Philadelphia, 1823. (H S V).

An Exploration of the Country lying between the Missouri river and the Rocky Mountains, on the line of the Kansas and Great Platte rivers, by J. C. Fremont. Washington, 1843, 207 pp. and map, 6 plates. (H U V).

Report of the Exploring Expedition to the Rocky Mountains, in 1842, and of Oregon and North Carolina, in the years 1843-44, by Capt. John C. Fremont. Washington, 1845, 693 pp., 24 plates and 3 maps. (H S U V).

Gives figures of Kansas Fossils.

Exploration and Survey of the Valley of the Great Salt Lake of Utah, including a reconnoissance of a new route through the Rocky Mountains, by Capt. Howard Stansbury, U. S. Army. Washington, 1853, 495 pp., 58 plates, and atlas of two maps. (H V).

Exploration of the Red river of Louisiana, in the year 1852, by Capt. R. B. Marcy, U. S. Army. Washington, 1854, xiv and 286 pp., 66 plates and sections, and atlas of two maps. (A H S U V).

Refers to the gypsum north of the Arkansas river in Kansas.

Geological Report of the country explored under the 38th and 41st parallels of north latitude, in 1853-54, by James Schiel. Pacific R. R. Reports, Vol. II. Washington, 1855, Chap. X, 3 plates. (H V).

Kansas Fossils.

Report of the Geological Exploration from Fort Leavenworth to Bryan's Pass, made in connection with the survey of a road from Fort Riley to Bridger's Pass, under command of Lieut. F. T. Bryan. Washington, 1856. Also in 35 Cong., 1st Sess., Sen. Ex. Doc. 2, pp. 489-520. (H V).

Geology, by H. Englemann.

United States Preliminary Field Report of Survey of New Mexico and Colorado, by F. V. Hayden, 1869, p. 14. (H V).

Gives occurrences of cretaceous rocks on line of Kansas Pacific railway at Hays City and Fort Wallace, Kansas.

Geological Report of the Yellowstone and Missouri rivers, by Dr. F. V. Hayden, under direction of Capt. W. F. Reynolds, in 1859-60, printed in 1869. (V).

Chapter XII, entitled "Geological Explorations in Kansas," gives the succession of strata up the Kaw valley from Lawrence to Fort Riley and thence to Salina, being an account of the exploration in 1858. Article on fossil plants collected in the expedition is by Dr. Newberry, who names several Kansas localities. (A).

United States Geological Final Survey of Nebraska, Hayden and Meek, 1868. Printed in 1872. (H S V).

Chapter IX, pp. 66-69, is a sketch of the "Geological Formations along the Union Pacific railway, eastern division, from the Missouri river to Fort Riley, Salina, and Fort Wallace," Kansas.

Preliminary Report of the U. S. Geological Survey of Wyoming and portions of contiguous territories, being a second annual report of progress conducted under the authority of the Secretary of the Interior, by F. V. Hayden. Washington, 1872, 511 pp. (A H S V).

Contains report on fossil reptiles and fish of the cretaceous rocks of Kansas, by E. D. Cope, pp. 385-424. Also Kansas cretaceous invertebrate fossils, by F. B. Meek, pp. 304-7. Also Kansas plants, by Lesquereux, 370, et seq.

Preliminary Report of the U. S. Geological Survey of Montana, and portions of adjacent territories, being a fifth annual report of progress, by F. V. Hayden. Washington, 1872, 538 pp. (A H S U V).

Contains a report on the geology and paleontology of the cretaceous strata of Kansas, by E. D. Cope, pp. 318-349.

Geological Report of B. F. Mudge. Notes on the Tertiary and Cretaceous periods of Kansas. Bulletin U. S. Geol. Survey of the Territories, Vol. II, No. 3, 1876, pp. 211-221. (H S).

U. S. Geological and Geographical Survey of the Territories. 6th Annual Report. Hayden, 1872. (H S).

Contains "Lignitic formation and fossil flora," by Leo Lesquereux. Describes several Dakota leaves from Saline and Ellsworth counties, Kas.

U. S. Geological and Geographical Survey of the Territories. Ninth Annual Report. Hayden, 1875, printed 1877. (A H S).

- Contains, p. 277, "Geological Report, by B. F. Mudge. Notes on the Tertiary and Cretaceous Periods of Kansas;" reprinted from Bulletin, Vol. II, No. 3, with much additional matter.
- Contributions to the Fossil Flora of the Western Territories, Part I, The Cretaceous Flora, by Leo Lesquereux, U. S. Geol. Surv. Territories, Hayden, Vol. VI. Washington, 1874, 136 pp., 30 pl. (A V).
- Contributions to the Fossil Flora of the Western Territories by Leo Lesquereux. Vol. VIII of U. S. G. Survey of the Territories, Hayden, 1883; plates. (A H S V).
- Describes many Kansas specimens and identifies the "Cretaceous formation at the base of the Rocky Mountains with that of Kansas."
- Invertebrate Cretaceous and Tertiary Fossils, by F. B. Meek, Vol. IX, U. S. G. Survey of the Territories. Hayden, 1876; plates. (A H S).
- Refers to cretaceous beds of Central Kansas.
- Vol. II, U. S. G. Survey of the Territories. "Cretaceous Vertebrata," E. D. Cope. Hayden, 1875; plates. (A H S).
- Describes Kansas specimens. This volume refers to Kansas specimens over sixty times, to B. F. Mudge twenty-eight times, and dedicates three specimens to him and several to Prof. Merrill, of Topeka, and Surgeons King and Shearer of Fort Wallace. Describes, on pp. 43 et al., cretaceous beds of western Kansas and says that thirty-seven species of reptiles found in Kansas varied from ten to eighty feet in length and represented ten orders.
- Vertebrata of the Tertiary Formations of the West, E. D. Cope. Vol. III, U. S. G. Survey of the Territories. Hayden, plates. (A H S V).
- Locates Loup Fork and Pro-camelus beds in N. W. Kansas.
- Course of Sciences applied to Military Art, Part I, Geology, by A. W. Vogdes, Fort Monroe, Va., 1884, 176 pp., 22 plates and maps. (V).
- The name of Kansas series to the Lower Permian of Prof. Swallow's Section, as defined in his Preliminary Report on the Geology of Kansas. These rocks consist of limestones, shales, conglomerates, sandstones, and gypsums, outcropping along the banks of Cottonwood, Cary, and Fancy creeks, and includes the limestones, blue shales and marls of Fort Riley and Manhattan, Kansas.
- Tenth U. S. Census, Vol. X, pp. 274-277. "Kansas' Building Stones." G. C. Broadhead, with geological section. (H).
- Eleventh U. S. Census, Bulletin No. 43, March, 1891. "Coal product west of the Mississippi." Gives area of Kansas coal measures much too small. See also Bulletin No. 75, on Gypsum. (H).
- United States Geological Survey, J. W. Powell, Director:
- Third Annual Report, 1881-82. (A H). Contains:
- Birds with Teeth, by O. C. Marsh.
- Says (p. 50) that the first bird remains were found in 1870, near the Smoky Hill river in western Kansas, and remains of 100 individuals have since been obtained there.
- Sixth Annual Report, 1884-85. (A H). Contains:
- Topographic work in Kansas, pp. 10, 11.
- Geological work in Kansas, pp. 32, 39, 72.
- Geologic features of Kansas, p. 314.
- Seventh Annual Report, 1885-86. (A H). Contains:
- Geography of Kansas, p. 45.
- Atlas sheets of Kansas, p. 59.
- Work in Kansas, pp. 110, 111.

Eighth Annual Report, 1886-7, Part I. (A H). Contains:

Area surveyed and atlas sheets of Kans., pp. 70, 71, 169, 170, et al.
Kansas gas field, p. 89.

Part II contains Fossil Plants in Kansas, by Lester Ward, pp. 667, 899, 900, et al.

Ninth Annual Report, 1887-8. (A H). Contains:

Surveys in Kansas, pp. 3, 49, 56.
Geologic work in Kansas, p. 104.

Tenth Annual Report, 1888-9. (A H). Contains:

Topographic Survey in Kansas, pp. 6, 8, 84, 89, 95, 103.
Geological work at Fort Riley, pp. 31, 154.

Eleventh Annual Report, 1889-90, Part I. (A H). Contains:

Topographic work in Kansas, pp. 5, 7, 34, 39, 46.
Kansas rock gas and oil, p. 598.

Twelfth Annual Report, 1890-91, Part I. (A). Contains:

Atlas sheets of Kansas, p. 7.
Topographic work in Kansas, pp. 4, 6, 7, 24, 29, 30, 47.

United States Geological Survey, J. W. Powell, Director:

Bulletin No. 7, 1884. A catalogue of geological maps relating to N. and S. America, by Jules Marcou. (A H).

Gives maps of Kansas of Hayden and Mudge, Nos. 56, 623, 772.

Bulletin No. 32. Mineral Springs of the United States, by Albert C. Peale. (A H).

Gives analyses of several mineral waters of Kansas.

Bulletin No. 57, Washington, 1890, 49 pp., 2 pll. A Geological Reconnaissance of Southwest Kansas, by Robert Hay. (A H).

Bulletin No. 76. Washington, 1891. A Dictionary of Altitudes, by Henry Gannett, 2d edition [1st ed. was Bulletin No. 5.] (A H).

Gives most of Kansas railway altitudes.

Bulletin No. 80, 1891. Correlation papers, Devonian and Carboniferous. (A H).

Chapter IX discusses "Permian problem in Kansas and Nebraska" and locates productive coal measures in Kansas.

Bulletin No. 82, 1891. Correlation Papers, Cretaceous, by C. A. White. (A H).

Gives Hill's Texas Trinity sands in southern Kansas, and refers to work on the cretaceous formations of the state by Hay, Hayden, Lesquereux, Meek, and Mudge.

Bulletin No. 84, 1892. Correlation Papers, Neocene, by Dall and Harris. (A H).

Cites Hay on western Kansas Tertiaries, pp. 299-301.

United States Geological Survey, J. W. Powell, Director:

Monographs, Vol. XVII. The Flora of the Dakota group. A posthumous work by Leo Lesquereux, edited by F. H. Knowlton, 256 pp., 66 pll., 1892. (A H S).

States that the Dakota group has 460 species of fossil plants and gives over 300 found in Kansas. New species are described of which many are named in honor of J. E. West, and some for Profs. Mudge and Snow, and for R. Hay, S. Mason, A. Wellington, and C. Sternberg.

United States Geological Survey, J. W. Powell, Director:

Mineral Resources of the United States, 1882-3; by Albert Williams, Jr. (A H).

Mentions Kansas lead, p. 312. Zinc, p. 368. Coal and other minerals, p. 682.

Mineral Resources for 1883-4, by Albert Williams, Jr. (A H S).

Mineral Resources for 1885, by David T. Day. (A H).

Mineral Resources for 1886, by David T. Day. (A H).

Mineral Resources for 1887, by David T. Day. (A H).

Mineral Resources for 1888, by David T. Day. (A H S).

Mineral Resources for 1889, by David T. Day. (A S).

Mineral Resources for 1890, by David T. Day. (A S).

Mineral Resources for 1891, by David T. Day. (A H).

Mineral Resources for 1892, by David T. Day. (A).

All these have some notice of Kansas minerals and the volume for 1892 has Kansas minerals under these heads: Cement, Clay, Coal, Coke, Gypsum, Lead, Limestone, Mineral Waters, Salt, Sandstone, and Zinc.

Coal, by Chas. A. Ashburner. Washington, 1888, is a separate of the Report on Mineral Resources for 1887.

Gives coal in Kansas, pp. 253-256.

Smithsonian Institution reports and papers:

Proceedings of U. S. National Museum for 1879, Vol. II. (S. M. C. Vol. XIX.) Washington, 1880, p. 292 et seq. (A H S).

Description of new Cretaceous invertebrate fossils from Kansas and Texas, by C. A. White. Says "Two aviculids were discovered by Prof. B. F. Mudge in strata of the Dakota group, Saline Co., Kansas, and sent by him to the National Museum." Refers to others from the same locality, described in Vol. IX of the U. S. G. Survey of the Territories. One is named *Gervillia Mudgeana* (p. 290). Says the discoveries of Prof. Mudge have done more than all the others to show the molluscan fauna of the Dakota group.

An account of the Progress in Geology in the years 1887-88, by W. J. McGee. Washington, 1890. Extract from the Smithsonian Report for 1888. (A H).

Refers to work of Kansas Academy of Science and Washburn College.

Preliminary Handbook of the Department of Geology in the U. S. National Museum, by Geo. P. Merrill, from Report Nat. Mus., 1889. (A H).

Appendix E states (p. 34) Kansas has 63 specimens of building stones, and (p. 38) 21 specimens of zinc and lead ores, marcasite, rock salt, and pumice dust, in the Museum.

Report Smithsonian Institution, 1885-6, Part II. Collection of Building and Ornamental stones in the U. S. National Museum: A Handbook and Catalogue, by Geo. P. Merrill.

Describes more fully the stones in the Museum.

U. S. Department of Agriculture:

Artesian Wells of the Great Plains. Report of Commissioners C. A. White and Samuel Aughey. Washington, 1882. (A H).

Gives some cretaceous geology near the Kansas, Colorado, Nebraska line.

Letter from Secretary of Agriculture (J. M. Rusk) transmitting a report on location of artesian wells west of the 97th meridian to the eastern foothills of the Rocky Mountains. Washington, 1890. Pp. 37-47, Sen. Ex. Doc. No. 222, 1st Sess., 51 Cong.

Gives tertiary and cretaceous geology of western Kansas in report of R. Hay.

Artesian, Underflow, and Irrigation Investigation: Progress report. Washington, 1891, Sen. Ex. Doc. No. 53, 2d Sess., 51st Cong., pp. 142, 143. (A H).

Alludes to water-bearing strata in western Kansas.

Artesian, Underflow, and Irrigation Investigations: Final report. Washington, 1892. Part II, by E. S. Nettleton, Chief Engineer. (A H S).

Gives several topographic profiles showing depths to water-bearing strata in western Kansas.

Part III, Report of Chief Geologist, Robt. Hay. Senate Ex. Doc. No. 41, 1st Sess., 52d Cong.

Gives diagrams of geologic sections from Rocky Mountains to 98th meridian in northern Kansas, and north-and-south sections on 100th and 102d meridians, and map showing distribution of tertiary formations in western Kansas and adjoining states.

Same work, second edition, 1893. The four parts bound in one volume. United States Geological Exploration of the 40th parallel. Clarence King, by order of Secretary of War. Washington, 1880. Vol. VII, 201 pp., 34 plates. *Odontornithes*, a monograph on the extinct toothed birds of North America, by O. C. Marsh. (H S).

Type specimens from western Kansas Cretaceous are described and figured, and credited to Prof. Mudge, S. W. Williston, and H. Brous, pp. 192 to 199, pl. I, XX, XXI, XXVI-XXXIV, et al.

Under *Ichthyornis dispar*, Marsh says "The type specimen of this species was found in 1872, by Prof. B. F. Mudge, near the Solomon river in north-west Kansas;" and makes the following references to other descriptions:

"Marsh, *Am. Jour. Sci.*, Vol. IV, p. 344, Oct., 1872; Vol. V, p. 161, Feb., 1873; p. 230, Mar. 1873."

"*Jour. de Zoologie*, Tome IV, p. 494, pl. XV, 1875; VI, 161." (S).

"*Colonosaurus mudgei*. *Am. Jour. Sci.*, Vol. IV, p. 406, Nov., 1872."

"Coues. *Key to North American Birds*, p. 350, 1872."

"Owen. *Jour. Geol. Soc. of London*, Vol. XXIX, p. 520, 1873."

"Woodward. *Pop. Sci. Review*, Oct., 1875, p. 349."

"Huxley. *N. Y. Lectures. Pop. Sci. Monthly*, 1876. Vol. X, pp. 215-218."

"Huxley. *American Addresses*, pp. 54-55. London, 1877."

In the appendix, pp. 191-201, Marsh says: The list comprises nine genera any twenty species, nearly all of which were found in western Kansas.

II. KANSAS OFFICIAL REPORTS.

Report of the Geological Survey of Miami Co., Kansas, by G. C. Swallow, State Geologist, Kansas City, 1865, 24 pp., map. Republished without the map in Preliminary Report Geology of Kansas, 1866, pp. 70-94.

(Wanting.) (H V).

First Annual Report (for 1864) on the Geology of Kansas, by B. F. Mudge, State Geologist. Lawrence, 1866, 56 pp. (A H S V).

Preliminary Report of Geological Survey of Kansas, by G. C. Swallow, State Geologist. Lawrence, 1866, 198 pp. (A H V).

Kansas State Board of Agriculture:

Annual volumes for 1872, 1873, 1874, 1875, had geological papers of the Kansas Academy of Science, which will be given under "Transactions of Academy."

Vol. III, 1874, had extracts by Secretary from Mudge's Report as State Geologist, in 1866. (A).

Fourth Annual Report for 1875 had also Geology of Kansas, by B. F. Mudge, pp. 107-127. (A H).

The Report of the Eighteenth Annual Meeting of the State Board of Agriculture for the year 1889, contains: Artesian wells in relation to irrigation in western Kansas, by Robert Hay, pp. 24-33. (A H S V).

The Report of Proceedings of the Nineteenth Annual Meeting, January, 1890, contains: Some New Kansas Industries, by Robert Hay. (A H).

Refers to business based on mineral resources, cement, vitrified bricks, salt, etc.

Report of Proceedings of Annual Meeting, January, 1891, contains: Irrigation in western Kansas, its possibilities and water supply, by Robert Hay. (A H).

Gives geology of the underground waters.

Report Twenty-first Annual Meeting for 1892, contains: The Water Conditions of Western Kansas, by Robert Hay, pp. 51-57. (A H S V).

Report of Twenty-second Annual Meeting, 1893, contains: The Geology of some Kansas soils, by Robert Hay, pp. 143-146. (A H V).

Report of Twenty-third Annual Meeting, January, 1894, contains: A Chapter of Kansas Geology, by Prof. S. Z. Sharp. (A).

Refers to geologic structure of McPherson county.

Kansas Minerals at the World's Fair, by Robert Hay. (A).

Quarterly Report of the State Board of Agriculture, December 31, 1883, contains: The Lower Coal Measures of Southeasteru Kansas, by Orestes St. John, with section and map. (A H).

March 31, 1886, contains: Water Supply of western Kansas. (A H).

Kansas State Board of Agriculture:

First Biennial Report for the years 1877-78, contains: Geology of Kansas, by B. F. Mudge, pp. 46-88, with map, 2 sections, 6 plates. (A H S V).

Third Biennial Report for the years 1881-82, contains: Sketch of the geology of Kansas, by O. St. John, pp. 571-599, sections and maps. (A H V).

Fourth Biennial Report for the years 1883-84, contains: Geological Summary, presumably by the Secretary, pp. 499, 504. (A H S).

Fifth Biennial Report for the years 1885-86, contains: Notes on the Geology of Southwest Kansas, by Orestes St. John, pp. 132-152. Natural Gas in Eastern Kansas, with appendix on Oil, by Robert Hay, pp. 198-208, with illustrations. What constitutes a good soil, by E. H. S. Bailey, pp. 181-184. (A H S).

Sixth Biennial Report for the years 1887-88, contains: Northwest Kansas, its topography, geology, climate, and resources, by Robert Hay, pp. 92-116, 2 sections. (A H S V).

Composition and Evaporation power of Kansas Coals, by E. H. S. Bailey and L. I. Blake, pp. 157-163. Salt, its discovery and manufacture in Kansas, with suggestions for its use in agriculture, by Robert Hay, pp. 192-204. (A H V).

Seventh Biennial Report, for the years 1889-90, contains: Geology of Kansas salt, by Robert Hay, pp. 83-96, 2 sections. (A H S V).

Eighth Biennial Report for the years 1891-92, contains: Geology and Mineral Resources of Kansas, by Robert Hay, 66 pp., and map. (A H S V).

Also issued separately as a World's Fair Edition, Topeka, 1893.

Transactions of the Kansas Academy of Science, printed by the state.

In annual volume of the State Board of Agriculture for 1872. (A H V).

Coals of Kansas, by W. H. Saunders, p. 387.

Limestone and Coal, by B. F. Mudge, p. 392.

Geology of Arkansas, by B. F. Mudge, p. 408.

In annual volume for 1873: (A H V).

Recent Discoveries of Fossil Footprints in Kansas, by B. F. Mudge.

In annual volume for 1874: (A H V).

The Pliocene Formation of Kansas, by B. F. Mudge.

A Geological Survey of Kansas, by B. F. Mudge.

Analysis of Kansas Clays, by Wm. H. Saunders.

Analysis of Soils, by W. K. Kedzie.

In annual volume for 1875: (A H V).

Kansas Chalk, by G. E. Patrick.

Analysis of Kansas Soils, by G. E. Patrick.

Calamities, by M. V. B. Knox.

(Remarks on some characteristic fossils of western Kansas, by B. F. Mudge were not printed.)

Transactions of the Kansas Academy of Science, separately printed.

Vol. V, 1876, contains: (A H).

On Bison Latifrons in Kansas, by B. F. Mudge, p. 9.

Report on Geology, by B. F. Mudge, p. 4.

Iola Gas Well, by G. E. Patrick, p. 13.

Vol. VI, 1877-8, contains: (A H S).

Cretaceous Forests and their Migrations, by B. F. Mudge, p. 46.

Dermal Covering of a Mosasauroid Reptile, by F. H. Snow, p. 54.

On a Fossil Tusk found in Franklin Co., by Wm. Wheeler, p. 11.

Iola Mineral Well, by W. K. Kedzie, p. 58.

Mastodon Remains in Douglas Co., by Jos. Savage, p. 10.

Vol. VII, 1879-80, contains: (A H S).

The Great Spirit Spring, by G. E. Patrick, p. 22.

List of Kansas Minerals, by B. F. Mudge, p. 27.

Metamorphic Deposit in Woodson Co., by B. F. Mudge, p. 12.

Memorial of Professor Mudge, by J. D. Parker, p. 7.

Sink-holes in Wabaunsee Co., by Jos. Savage, p. 26.

Vol. VIII, 1881-82, contains: (A H S V).

The Coal Fields of Cherokee Co., by Erasmus Haworth, p. 7-11, map of Cherokee Co.

Preliminary list of Fossils in Riley Co., by S. C. Mason, pp. 12-13.

The Igneous Rocks of Kansas, by Robert Hay, pp. 14-18.

Vol. IX, 1883-84, contains: (A H S V).

The Age of Kansas, by B. B. Smyth, p. 129.

Octohedral Limonite, by E. Haworth, p. 25.

A new Kansas Mineral, by J. T. Willard, p. 25.

Preliminary Report on Geology of Norton Co., with map and section, by Robert Hay, p. 17.

Notes on Fossil Jaw of Bison, by Robert Hay, p. 98.

In the Dakota, by Robert Hay, p. 109.

"Is a Geological Survey a Necessity?" by Robt. J. Brown, p. 49.

Some Kansas Mineral Waters, by G. H. Failyer, p. 114.

Last Submergence and Emergence of Southeastern Kansas from the Carboniferous Seas, by J. P. West, p. 106.

- Utilization of Mineral Waters, by E. H. S. Bailey, p. 28.
 Fort Scott Artesian Well, by E. W. Walter and E. H. S. Bailey, p. 96.
 Vol. X, 1885-6, contains: (A H S V).
 Discovery of a Fossil Bird Track in the Dakota sandstone, by F. H. Snow, pp. 3-6.
 A Geological Section in Wilson Co., Kans., by Robert Hay, pp. 6-7, section down Fall River valley.
 Report on Geology, by Robert Hay, pp. 21-22.
 Historical Sketch of Geological Work in Kansas, by Robert Hay and A. H. Thompson, pp. 45-52.
 Coal Measures of Lyon Co., by D. S. Kelly, p. 45.
 Natural Gas in Eastern Kansas, by Robert Hay, pp. 57-62.
 Notes on a Remarkable Fossil, by Robert Hay, pp. 123-129, plate.
 Vol. XI, 1887-88, contains: (A H S V).
 Newly Discovered Salt Beds in Ellsworth Co., Kans., by E. H. S. Bailey, pp. 8-10.
 The Geology of Kansas, by Robert Hay, pp. 35-37.
 On the Discovery and Significance of Stipules in certain Dicotyledonous Leaves of the Dakota Rocks, by F. H. Snow, pp. 34-35, plate.
 Geology of the Leavenworth Prospect Well, by E. Jameson, pp. 37-38.
 Triassic Rocks of Kansas, by Robert Hay, pp. 38-39.
 Evaporating Power of Kansas Coals, by L. I. Blake, pp. 42-46.
 Composition of Kansas Coals, by E. H. S. Bailey, pp. 46-49.
 Vol. XII, 1889-90, contains: (A H S).
 Artesian Wells in Kansas, by Robert Hay, p. 24.
 Notes on Kansas Salt Marshes, by Robert Hay, p. 97.
 Barite in Concretionary Rocks, by E. H. S. Bailey, p. 45.
 Some Kansas Mineral Waters, by E. H. S. Bailey, p. 25.
 Structure of Kansas Chalk, by S. W. Williston, p. 100.
 New Plesiosaur from the Niobrara Cretaceous, by S. W. Williston, p. 174.
 Mammoth Remains in Franklin Co., by O. C. Charlton, p. 74.
 Vol. XIII, 1891-92. (A H S). Contains:
 Notes on a Pink Barite, by E. B. Knerr, p. 76.
 Composition of Building Stones, by E. H. S. Bailey, p. 78.
 On some new Cephalopods, by Robert Hay, p. 37.
 Glaciated Area in Northeastern Kansas, by Robert Hay, p. 104.
 Granite in a Deep Boring, by Robert Hay, p. 75.
 In Memoriam—Joseph Savage, by Robert Hay, p. 65.
 Minerals of Kansas, by G. H. Failyer, p. 76.
 A Food Habit of Plesiosaurs, by S. W. Williston, p. 121.
 Memoir of J. P. West, by S. W. Williston, p. 68.
 Niobrara Cretaceous of Western Kansas, by S. W. Williston, p. 107.
 Reports of State Inspector of Coal Mines:
 First annual, for 1884. Topeka, 1885, by E. A. Scammon. (A H V).
 Gives location of Kansas coal fields.
 Second annual, for 1885. Topeka, 1886, by Jno. R. Braidwood. (A H V).
 Has a chapter, "The coal deposits of Kansas."
 Third annual, for 1886-7. Topeka, 1888, by G. W. Findlay. (A H V).
 Statistics up to date.

- Fourth Annual, for 1890. (A H V). Contains:
 The Coal Deposits of Kansas, pp. 85-91.
 References to the localities of zinc and salt.
 Fifth Report (1st Biennial), 1891-92. (A H V).
 Usual statistics and location of salt mines.
- Kansas State Penitentiary, Henry Hopkins, Warden. Special report, Jan. 19, 1881, O. F. Lamm, Supt. (H).
 Supplemental Report, Jan. 1st, 1883.
 Describes the different strata passed through in sinking the Penitentiary coal shaft. (H).
- Mineral Resources of Kansas, 23 pp. Topeka, 1893. (A H V).
 A Compilation of the Kansas World's Fair Commissioners. Has a valuable array of statistics, but the geology is brief and inexact.
- Bulletins of the Washburn College Laboratory, edited by F. W. Cragin, Topeka.
- Vol. I, No. 2, January, 1885. Notes on the region of Crooked creek, by the editor. (A H S).
 No. 3, March, 1885. Notes on the Geology of southern Kansas, by the editor. (A H S).
 This refers the Barber Co. gypsum to the Dakota and Benton formations. Another note on same subject., Ed., p. 112.
 No. 5, May, 1886. Further notes on the Dakota Gypsum of Kansas. Editor. (A H S).
 No. 9. February, 1889. Geological notes on the region south of the Great Bend of the Arkansas. Editor. (A H S).
 Retracts a former assertion as to certain concretions being fossils. Recognizes the Cretaceous as being above the red beds and gypsum. Gives a section and names some fossils and names the strata Comanche Peak beds.
 No. 10, December, 1889. Contributions to the Paleontology of the Plains. Editor. (A H S).
 No. 11, March, 1890. On the Cheyenne sandstone and the Neocomian shales of Kansas. Editor. (A H S).
 Gives many details and several sections, and, as previously, calls the red beds Triassic.

OTHER KANSAS PUBLICATIONS.

- Agricultural Geology of Kansas, by W. K. Kedzie, 1877. (A H).
 Catalogue of Minerals, Fossils and Birds in the Agricultural room, Capitol Building, Topeka, Kans., 1875. (H).
 Probably the work of Prof. J. H. Carruth.
- A contribution to the Geology of the Lead and Zinc mining region of Cherokee Co., Kansas, by Erasmus Haworth. A Master of Science thesis. Os-kaloosa, Iowa, 1884.
- Golden Rod, November, 1892. Edited by W. S. Newlon, Oswego, Kansas.
 Notes on Kansas Glaciers, by Editor. (A).
- Golden Rod, No. 6. November, 1893. Swallow's Hydraulic Limerock, by Editor. (A H).
- Kansas University Quarterly, Lawrence, Kansas. (A H).
 July, 1892, contains:
 Kansas Pterodactyls. Part I, by S. W. Williston.
 Kansas Mosasaurs. Part I, by S. W. Williston and E. C. Case.

- October, 1892. (A). Contains:
 The Waconda Spring Mound, by E. H. S. Bailey.
- October, 1893. (A H). Contains:
 Kansas Pterodactyls, II, by S. W. Williston.
- In this article Doctor Williston objects to Marsh's generic name *Pteranodon*, on the ground that the genus was not new, and substitutes for it the older *Ornithostoma*.
- Kansas Mosasaurs, Part II, by S. W. Williston.
- Gives a complete restoration of a *Clidastes*.
- January, 1894. (A H). Contains:
 Report of Stratigraphic work in the field, southeastern Kansas, by Prof. Erasmus Haworth.
- The New Kansas Magazine. Vol. I, No. 10. Atchison, 1892, contains:
 The Salt of Kansas, by Robert Hay, pp. 5-6, map and section. (V).
- Transactions of the Academy of Science of St. Louis.
 Vol. I, 1858. (A V). Contains:
 Descriptions of new fossils from the Coal Measures of Missouri and Kansas, by B. F. Shumard and G. C. Swallow, pp. 198-227.
- Vol. II, 1868. (A H V). Contains:
 Mr. Meek's notes on my Report of the Geology of Kansas, by G. C. Swallow, pp. 517-526.
- The Rocks of Kansas, by Swallow and Hawn, p. 173.
- Vol. IV, contains:
 Carboniferous rocks of Eastern Kansas, by G. C. Broadhead, p. 481. (A).
- This gives in considerable detail Professor Broadhead's idea of the line between Permian and Coal Measures.
- F. B. Meek's Reply to Professor Swallow:
 "On Certain Disputed Points in the Geology of Kansas and other North-western Localities." July, 1869. (A H V).
- Annals New York Academy of Science, Vol. IV, 1887. (A V).
- The Genera and Species of North American Carboniferous Trilobites, by A. W. Vogdes, p. 67, 2 pll.
- Contains descriptions of *Phillipsia cliftonensis* Shum. and *P. major* Shum.
- Bulletin Denison University, Vol. II, Part I, 1887. (A V).
- A Sketch of the Geological History of Licking county, accompanying an illustrated catalogue of Carboniferous fossils from Flint Ridge, Ohio, by C. L. Herrick, 7 pll.
- American Journal of Science and Arts.
 Vol. XXII, 1851. Carboniferous Rocks of Southeastern Kansas, by G. C. Broadhead, p. 55. (S V).
- Vol. XXVI, 1858. The Rocks of Kansas, by G. C. Swallow, p. 182. (H S V).
- Vol. XXVII, 1859. On the so-called Triassic Rocks of Kansas and Nebraska, by F. B. Meek and F. V. Hayden, p. 31. (S V).
- Vol. XXXIX, 1865. Remarks on the Carboniferous and Cretaceous rocks of eastern Kansas and Nebraska, in connection with a review of a paper recently published on this subject by Jules Marcou and F. B. Meek, p. 157. (H S V).
- Vol. XLIV, 1867. Notes on the Geology of Kansas, by F. V. Hayden, p. 32. (H).
- Vol. XLVI, No. 136, 1868. Memoir "On some Cretaceous fossil plants

from Nebraska," by Leo Lesquereux, pp. 91-104. (H S).

Includes notice of some Kansas specimens.

American Journal of Science:

Vol. XXII, July, 1881. The Carboniferous Rocks of Southeastern Kansas, by G. C. Broadhead. (S).

Vol. XXXIX, May, 1890. "Notes of Cretaceous Dinosaurs," by O. C. Marsh. Specimens from Pteranodon beds of Kansas.

Refers editorially (p. 166) to Kansas Academy of Science, Snow's Bird-track, and Hay and Thompson's Historical Sketch of Geology.

Vol. XLII, 1891, p. 517, refers to note on Kansas Trilobites in Kansas City Scientist. (S).

Vol. XLIII, 1892, Kansas Meteorites. Kunz, p. 65; Hay, p. 80. (S).

American Geologist, published at Minneapolis, Minn. N. H. Winchell, Editor:

Vol. II, 1888, p. 404. Preliminary description of a new or little known Saurian from the Benton of Kansas, by F. W. Cragin.

Pp. 433-436, "Mitchell Co., Texas," is the title of a letter from G. C. Broadhead, which describes salt deposits in several Kansas counties.

Vol. III, 1889, p. 199. Reviews "Northwest Kansas", by R. Hay.

Vol. IV, 1889, p. 309. Reviews "Salt in Kansas", by Robert Hay.

P. 389, notices scientific articles, including geologic papers, read at Kansas Academy of Science at Wichita.

Vol. V, 1890, p. 65. Notes on a Kansas Salt Mine, illustrated. Being the substance of a paper read at the Toronto meeting of A. A. A. S., by Robert Hay.

P. 296. Artesian wells in Kansas and the causes of their flow. Illustrated. By Robert Hay.

Vol. VI, 1891, p. 9. The Permo-carboniferous of Greenwood and Butler counties, Kans., by L. C. Wooster, Eureka, Kans. P. 224. Editorial describes "Snow Hall of Natural History, Lawrence, Kans.," with some notice of its fossils. P. 389. Reviews Bulletin No. 57, U. S. G. S., "Southwest Kansas," by Robert Hay. (A S).

Vol. V, p. 309, and Vol. VI, p. 370. Have "Brenham, Kiowa Co., Kansas, Meteorite," illustrated, by N. H. Winchell and J. A. Dodge. (A S).

Vol. VII, 1891, p. 23. On Cheyenne Sandstone and Neocomian Shales of Kansas, by F. W. Cragin. P. 179. Further notes on Cheyenne Sandstones and Neocomian Shales, by F. W. Cragin. P. 340. Megalonyx Beds in Kansas, illustrated, by J. A. Udden. (A S).

Vol. VIII, 1891, p. 171. New observations on the genus Trinacromerum, by F. W. Cragin, being a continuation of the description in Vol. II, *ante*. (S).

Vol. IX, 1892, p. 254. Observations on Llama remains in Colorado and Kansas, by F. W. Cragin. (H S).

Vol. X, 1892, p. 131. Glacial Striae in Kansas, by L. C. Wooster. P. 330. Notice of division of chair of geology at Kansas State University. (H S).

Vol. XI, 1893, p. 359. Review of Geology and Mineral Resources of Kansas, by Robert Hay. (H S).

American Geology. Letter on some points of the geology of Texas, New Mexico, Kansas, and Nebraska, addressed to Messrs. F. B. Meek and F. V. Hayden, by Jules Marcou, Zurich, 1858, 15 pp. (H S V).

Kansas City Scientist:

Trilobites of the Upper Coal Measures group of Kansas City, Mo.

Vol. V, No. 3, 1891, p. 33, plate. (A H V).

Phillipsia major Shum. P. cliftonensis Shum. He refers Pooetus

longicaudatus Hall to *Phillipsia major* and remarks that the upper coal measures of Kansas extend westward to near the west county line of Greenwood Co., Kansas, whereas the trilobite in question was found some 25 miles east of this line at Madison.

Mammoth Sigillaria, by Edwin Waters. No. 9, September, 1891, p. 140, describes large specimens now in Snow Hall at Lawrence and at Yale College, and says that they were found almost at the top of the coal measures in Greenwood Co., Kansas.

Prospectus, Reports, and other information relating to Kansas Coal Belt Mining Company, Shenandoah, Penna., 1884, 31 pp.. with map.
Geological Survey of Missouri:

The 1st and 2d Annual Reports of the Geological Survey of Missouri, by G. C. Swallow, State Geologist. Jefferson City, Mo., 1855, 209 and 239 pp., 15 pll., 19 sections, and 5 maps. (A H V S).

Refers to the position of the loess on the Missouri river and to the similarity of the rock strata on each side.

Report of the Geological survey of the State of Missouri, by G. C. Broadhead. Jefferson City, 1873, 323 x iv pp., 3 plates and sections and 9 maps. (A S V).

Contains observations on the geology of Kansas.

Geological survey of Texas. Second Annual Report. Austin, 1891. Cites R. Hay on "Red-beds," pp. 336-421. On Salt of Kansas, p. 445. Article on Carboniferous Cephalopods, by Alphaeus Hyatt, describes several new species from Geary Co., Kansas. (A H S).

This paper is also printed separately, pp. 329-356. Illustrated.

Second Geological Survey of Pennsylvania. Coal Flora of the United States, by Leo. Lesquereux, Vol. I, 1880, p. 109. (A H).

Vol. III, 1884, p. 880, gives six Kansas localities and describes 28 species of Kansas coal plants. (A H).

One locality given is Ellsworth, which, if correct, implies that a widely spread coal measures *Neuropteris* is found in Cretaceous strata.

Geological Survey of Illinois: Vol. VII, 1883, gives (p. 193) Range of Fossils in Kansas coal measures, and describes, pp. 214, 240, 249, fossils from Kansas, two being named after the finders, Professor Mudge and Mrs. St. John. (A S).

Catalogue of *Pythonomorpha*, found in the Cretaceous strata of Kansas, by E. D. Cope. (A H).

Read before the American Philosophical Society, Dec. 17, 1871. Transactions Am. Phil. Soc., Vol. XIV.

On a new Testudinata from the chalk of Kansas, by E. D. Cope. Transactions Am. Phil. Soc., Jan., 1872. (A H).

On two New Ornithosaurians from Kansas, by E. D. Cope. Trans. Am. Phil. Soc., March, 1872. (A H).

American Naturalist. May, 1887. Mesozoic and Cenozoic realms of the interior of North America, by E. D. Cope.

Refers to the existence of the Loup Fork formation in Kansas.

Syllabus of University extension lectures, by E. D. Cope.

Refers to coal measures and other strata of Kansas. Philadelphia, 1891. American Geological Classification and Nomenclature, by Jules Marcou. Cambridge, Mass., 1888. Printed for the author.

Gives upper coal measures in the Dyas in Kansas.

Kansas in a Nutshell, by George P. Guerrier. Cambridge, Mass. 1889.

Cites R. Hay in "Atchison Champion" on extent of geological knowledge of Kansas.

Fifth International Congress of Geologists, "Geological Guide Book of the Western Excursion". (A).

Gives brief itinerary of the geology of Kansas from Phillipsburg to Kansas City. Washington, August, 1891.

"Kansas". A pamphlet issued by Missouri Pacific Ry. Co., 1892.

Reprints article on water supply of western Kansas from Annual Report of the State Board of Agriculture, which gives the geology of the water-bearing strata. (A H).

Kansas City Review of Science and Industry contains the following geological articles:

Kedzie, W. K. Iola, Kansas, mineral well. Vol. I, No. 5, July, 1877. (A H).

Case, Theo. S. Wyandotte, Kansas, gas well. Vol. I, No. 6, August, 1877. (A H).

Case, Theo. S. The mineral region of southwest Missouri and southeast Kansas. Vol. I, No. 7, Sept., 1877. (A H).

Parker, J. D. The river bluffs. Vol. I, No. 8, Oct., 1877. (A H).

Phillips, J. VanCleave. Geology of the West. Vol. I, No. 8, Oct., 1877. (A H).

Mudge, B. F. Fossilization of flesh an impossibility. Vol. I, No. 8, 10, Oct., Dec., 1877. (A H).

Mudge, B. F. Fossil leaves in Kansas. Vol. I, No. 2, Jan., 1878. (A H).

Missouri (Kansas) Mineral Production. Anon. Vol. II, No. 2. April, 1878. Correspondence of the Engineering and Mining Journal. (A H).

Snow, F. H. On the dermal covering of a Mosasauroid Reptile. Vol. II, No. 8, Nov., 1878. (A H).

Great Springs, Cawker City. Vol. III, No. 2, June, 1879. Correspondence Kansas City Times. (A H).

Mudge, B. F. The new Sink-hole in Meade county. Vol. III, No. 3. June, 1879. (A H).

Mudge, B. F. Are birds derived from Dinosaurs? Vol. III, No. 4, August, 1879. (A H).

Thorne, J. The Rosedale Gas and Coal Wells. Vol. III, No. 7, Nov., 1879. (A H).

Broadhead, G. C. Notes on the surface geology of southwest Missouri and Southeast Kansas. Vol. III, No. 8, Dec., 1879. (A H).

Guild, Edgar W. Western Kansas—Its Geology, Climate, Natural History, etc. Vol. III, No. 8, December, 1879. (A H).

Parker, J. D. Kansas Scientific Survey. Vol. IV, No. 10, Feb., 1881. (A H).

Haworth, Erasmus. Chemical and Dynamical Geology. Vol. V, No. 2, June, 1881. (A H).

Broadhead, G. C. Geological notes on the Central Branch Union Pacific Railroad. Vol. V, No. 3, July, 1881. (A H).

Sternberg, C. H. The Fossil Flora of the Cretaceous Dakota group of Kansas. Vol. V, No. 4, August, 1881. (A H).

Broadhead, G. C. Carboniferous Rocks of Southeast Kansas. Vol. V, No. 5, Sept., 1881. (A H).

Parker, J. D. The Burlington Gravel Beds. Vol. V, No. 6, Oct., 1881. (A H).

Haworth, E. Joplin City White Lead Works. Vol. V, No. 7, November, 1881. (A H).

Haworth, E. Chert Rocks of Sub-carboniferous Kansas. Vol. V, No. 2, March, 1882. (A H).

Broadhead, G. C. The chalk beds of Wa-Keeney, Kansas. Vol. V, No. 10, February, 1882. (A H).

Broadhead, G. C. Geological Notes on a part of Southeast Kansas. Vol. VI, No. 3, July, 1882. (A H).

Sternberg, C. H. Loup Fork Group of Kansas. Vol. VI, No. 4, Aug., 1882. (A H).

Chase, Geo. S. Kansas Academy of Science. Text of bill providing for a geological survey of Illinois. Vol. VI, No. 9-10. Jan.-Feb., 1883. (A H).

Clerk, F. L. The Lead and Zinc Region of Missouri and Kansas. Vol. VII, No. 6, Oct., 1883. (A H).

Haworth, E. Notes on Kansas Minerals. Vol. VII, No. 6. Oct., 1883. (A H).

Knaus, Warren. Note on a new Mineral (Celestite) in Central Kansas. Vol. VII, No. 10, February, 1884. (A H).

Lantz, D. E. The Supply of Coal. Vol. VII, No. 12, April, 1884. (A H).

Kansas Coal. Vol. VII, No. 12, April, 1884. Reprinted from the Kansas City Journal. (A H).

Sternberg, C. H. The Flora of the Dakota Group. Vol. VIII, No. 1, May, 1884. (A H).

Parker, J. D. The Russell Artesian Well. Vol. VIII, No. 2-3. June-July, 1884. (A H).

Jerome, F. E. Russell Artesian Well. Vol. VIII, No. 2-3. June-July, 1884. (A H).

Lykins, W. H. R. List of Fossils in Kansas City and vicinity. Vol. VIII, No. 2-3, June-July, 1884. (A H).

Scammon, E. A. Coal in Kansas for 1883. Vol. VIII, No. 2-3. June-July, 1884. (A H).

Haworth, Erasmus. Geology and Mineralogy of Cherokee county, Kansas, Notice of. Vol. VIII, No. 2-3, June-July, 1884. (A H).

Sternberg, C. H., and W. W. Russ. Note on Saurian, Ottawa Co. Vol. VIII, No. 2-3. June-July, 1884. (A H).

Sternberg, C. H. Directions for Collecting Vertebrate Fossils. Vol. VIII, No. 4, Aug., 1884. (A H).

Parker, J. D. The Burlington Gravel Beds. Vol. VIII, No. 7, Nov., 1884. (A H).

Brown, Dr. R. J. Is a Geological Survey of the State a Necessity? Vol. VIII, No. 8, Dec., 1884. Read before the Kansas Academy of Science, Nov., 1884. (A H).

West, E. P. The last Submersion and Emergence of Southeastern Kansas from the Carboniferous Seas, or those affecting the Carboniferous formation in Kansas. Vol. VIII, Nos. 9 and 10, Jan. and Feb., 1885. (A H).

Bailey, E. H. S., and E. W. Walter. The new Artesian Well at Fort Scott. Vol. VIII, No. 9. Jan., 1885. (A H).

The Geological Survey of Kansas (editorial). Vol. VIII, No. 10, Feb., 1885. (A H).

Parker, J. D. Kansas Scientific Survey. Vol. VIII, No. 10, Feb., 1885. (A H).

Cragin, F. W. Tertiary in Harper County. Vol. VIII, No. 2, March, 1885. (A H).

- Cragin, F. W. Some Geological and Topographical Features of Southern Kansas. Vol. VIII, No. 12, April, 1885. (A H).
- Holder, Chas. F. Monster Sea-turtle found in Kansas. Vol. IX, p. 333. (A H).
- Bulletin of the Geological Society of America. Vol. I, New York, 1890. Contains (p. 26) remarks of R. Hay on the absence of lignite under Kansas prairie in certain localities as illustrating pressure. (A).
- Vol. II, Rochester, 1891. On p. 19, H. S. Williams refers to Kansas Carboniferous formations, and on p. 518, R. T. Hill refers to Cragin on the Kansas Cretaceous. (A).
- Vol. III, Rochester, 1892. Contains, on page 80, remarks of G. C. Broadhead on black soils in Kansas, and on p. 519 a contribution to the geology of the great plains, by Robert Hay, which describes the Tertiary deposits of western Kansas and their relation to subjacent Cretaceous. (A).
- Vol. VI, Rochester, 1894. Contains (p. 29) Kansas river section of the Permo-carboniferous and Permian rocks of Kansas, by Chas. S. Prosser. (A).
- Manual of Geology, by J. D. Dana. 2d Ed., New York, 1876.
- Treats of Kansas Carboniferous, pp. 231-320; Permian, 356; Triassic, 423; Chalk and Cretaceous, 455-6. (A).
- Elements of Geology, by Joseph LeConte. New York, 1879.
- Treats of Kansas coal measures, p. 339; Permian, 402; Jura-trias, 440; Cretaceous, 551.
- Text Book of Geology, by Sir Archibald Geikie, illustrated. London, 1885.
- Refers (p. 818) to Odontornithes, or toothed birds from the Cretaceous beds of Kansas, and gives Marsh's figures of *Hesperornis regalis* and *Ichthyornis victor*.
- An American Geological Railway Guide. 2d Ed., by James McFarlane, Ph. D. New York, 1890. The geology on the Kansas railways is supplied by Prof. Orestes St. John.
- Johnson's Universal Cyclopedia, New York, 1886. Vol. IV, p. 552, article "Kansas" has half a column on "Geology and Mineralogy", which credits the state with Coal Measures, Permian Triassic, Cretaceous, and Drift formations, but blunders on the thickness of the coal seams. (A H S).
- Encyclopedia Britannica, R. S. Peale reprint, Chicago, 1892. Vol. XIII, p. 842, article "Kansas", has half a column under "Geology and Minerals," which is inaccurate and not up to date. (S).
- Vol. X, p. 352, article "Geology," refers to Permian in Kansas.
- Appleton's New American Cyclopedia, New York, 1871, Vol. X, article "Kansas," relates entirely to territorial times when Pike's Peak was "the highest mountain in Kansas." The only definite geological allusion that is correct for the state now is that the Missouri coal fields extend into Kansas. (S).
- Appleton's Annual Cyclopedia. Vol. II, 1877, p. 416, records discovery of lead. (S).
- Vol. VI, 1881, p. 468, gives product of coal from census of 1880. (S).
- Vol. XV, 1890, p. 68, article "New finds of Salt," mentions those in Reno Co., Kansas. (S).
- Chambers's Encyclopedia, Chicago and New York, 1886. Vol. IV, p. 57, article "Kansas," says "Coal, lignite, lead, marble, kaolin, gypsum and salt are among the minerals" of the state. (S).
- Article "Kansas River," says Republican fork rises in the Rocky mountains.

Chambers's Encyclopedia, Lippincott's Edition, Phila., 1890. Vol. VI, p. 392, article "Kansas" enumerates the following Kansas minerals: "Lead, zinc, coal, lignite, rock salt, mineral paint, gypsum, building stone, brick, clay, hydraulic cement." Gives output of coal, lead, and zinc for 1888-89. Article "Kansas River" says the river is formed by the "junction of the Smoky Hill fork and the Solomon river." (S).

Alden's Manifold Cyclopedia, New York, 1890. Vol. XXI, pp. 113, 114, article "Kansas," gives geology as including Coal Measures, Permian Triassic and Cretaceous. Records discovery of rock salt in 1887, and gives coal, lead, zinc and building stones as the worked minerals.

GEOLOGICAL MAPS OF KANSAS.

Outlined reduction of the maps of Kansas, Nebraska and Dakota geology, by F. V. Hayden. Trans. Amer. Phil. Soc., Vol. XII, Phila., 1862. (V).

Sectional map of Miami county, Kansas, by E. W. Robinson. Scale, 240 chains 1 inch. In Report of Geology of Miami Co., by G. C. Swallow, 1865. (H V).

Map showing the superficial strata of Kansas, by B. F. Mudge. Geology of Kansas, Topeka, 1878. (A H S V).

Map of mineral regions of Jasper and Newton counties, Mo., and Cherokee county, Kansas. Hutchinson and Co., Joplin, 1889. (A).

Map showing Tertiary formations of Smoky Hill-Republican region, by R. Hay. Final report of Artesian and Underflow Investigations, Washington, 1892. (H).

MISCELLANEOUS.

Notes on the geology of the survey for the extension of the U. P. Road, Eastern Division, from the Smoky Hill to the Rio Grande, by John L. Leconte, M. D. Phila., 1868. (H).

Notes the occurrence of vertebrate fossils on the Smoky Hill river.

Wilder's Annals of Kansas, Topeka, 1875. (New edition, later.) Refers to the State Geological Survey and Academy of Science, pp. 382, 388, 407, 417, 1013, et al. (H S U).

On p. 487 (1st edition) refers to the visit of Agassiz to Leavenworth in 1868, and refers to Leavenworth "Conservative" of that time for larger account. (A H S U).

Centennial History of the state of Kansas, by Prof. Chas. R. Tuttle. Madison, Wis., and Lawrence, Kans., 1876. (A H).

Gives localities of sandstones, limestones, and brick clays, and refers to opening of Leavenworth coal mine, pp. 51-62.

History of the state of Kansas, A. T. Andrews, Chicago, 1883. Has chapter on Geological Structure, illustrated, pp. 35-43. Mainly compiled from Prof. Mudge's reports and cites (p. 43) R. Hay on the igneous rocks of Woodson Co. (H).

On p. 275 gives organization and legislative recognition and brief history of Kansas Academy of Science, with names of the prominent geologists.

Kansas. Information concerning its Agriculture, etc. Special pamphlet by Wm. Sims, Secretary State Board of Agriculture, Topeka, 1884. (H).

Contains, pp. 2-8, Mineral Resources of Kansas, by O. St. John.

Congres Geologique International. Compte Rendu de la 5me session at Washington, 1891. Washington, 1893. (A).

Gives geology of the western plains, particularly northwestern Kansas, by S. F. Emmons, Robert Hay, and R. T. Hill, pp. 443-448.

Geologie. Asie et Amerique, par Emm. de Margerie. Extrait de l' Annuaire Geologique Universel. Tome VI, p. 575. Le Mans (France), 1890.

Gives Trinity beds in southern Kansas, and ascribes their discovery to "M. Cragin," pp. 32, 33.

REPORT OF THE BOARD OF CURATORS.

Your board of curators have the honor to report: That the office room of the Academy of Science at the state house has finally been cleared of the Labor Bureau, the State Historical Society, and all their paraphernalia, leaving the Academy in full possession of the rooms.

During January and February, 1894, Prof. Robert Hay was employed several days in overhauling, cleaning, and relabeling the specimens. The paleontological cases were moved from the vestibule into the west room and the specimens rearranged in them.

There have been added to the museum during the past year 28 specimens of reptiles and fishes of the state, from various counties (all are labeled); 500 specimens of coleoptera from Reno county, labeled; a number of specimens of rocks and geodes from Barber, Butler, Cherokee, Jackson, Norton, Shawnee and Sumner counties; rock salt from Rice county; silica from McPherson, Ellsworth, Lincoln and Jewell counties; two large specimens of petrified wood from the Dakota sandstone in northwest Kansas; and a large fossil, 35 feet in length, from the Niobrara, in Mitchell county. This last, which was supposed to be a petrified reptile, proves to be vegetable.

A. H. THOMPSON,
B. B. SMYTH,
ROBERT HAY,
Curators.